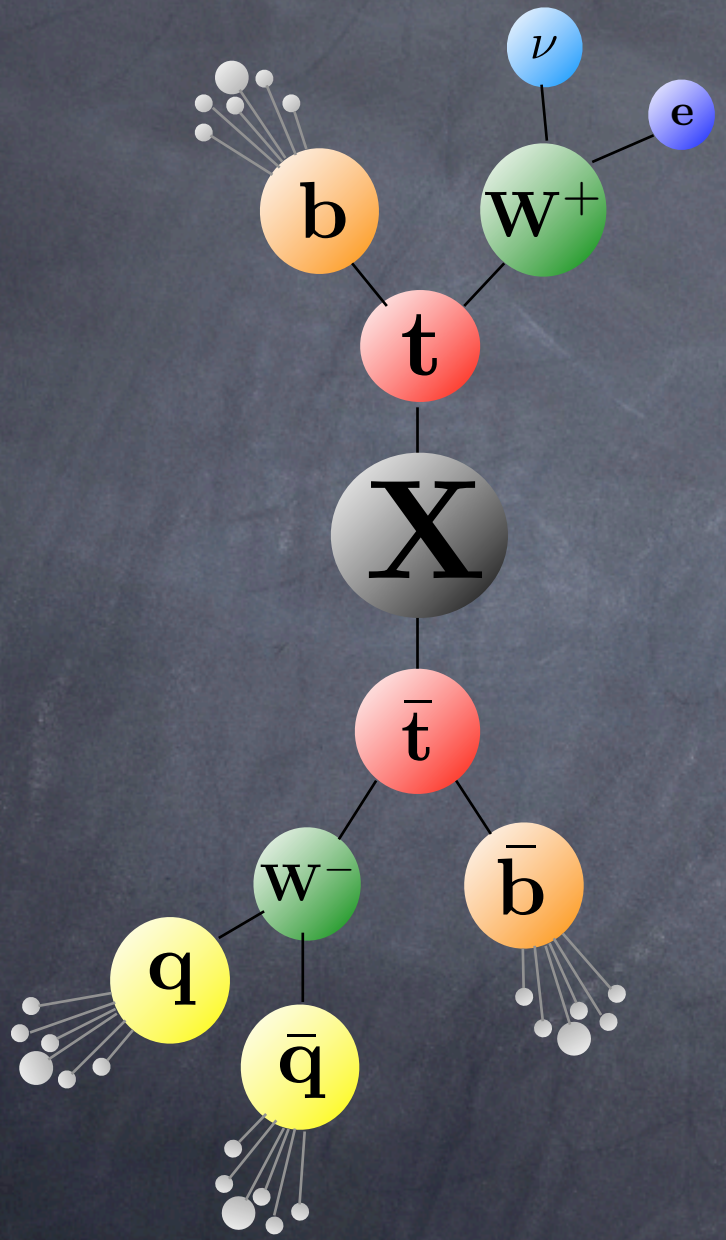
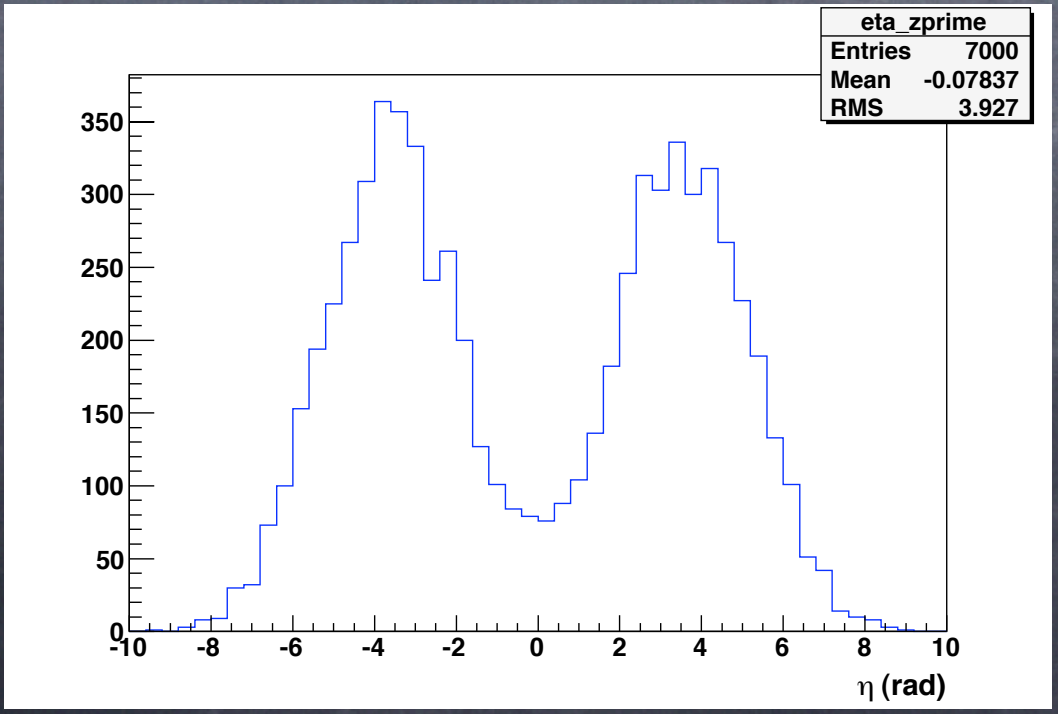


Mass Effects: a first look

Heather M. Gray

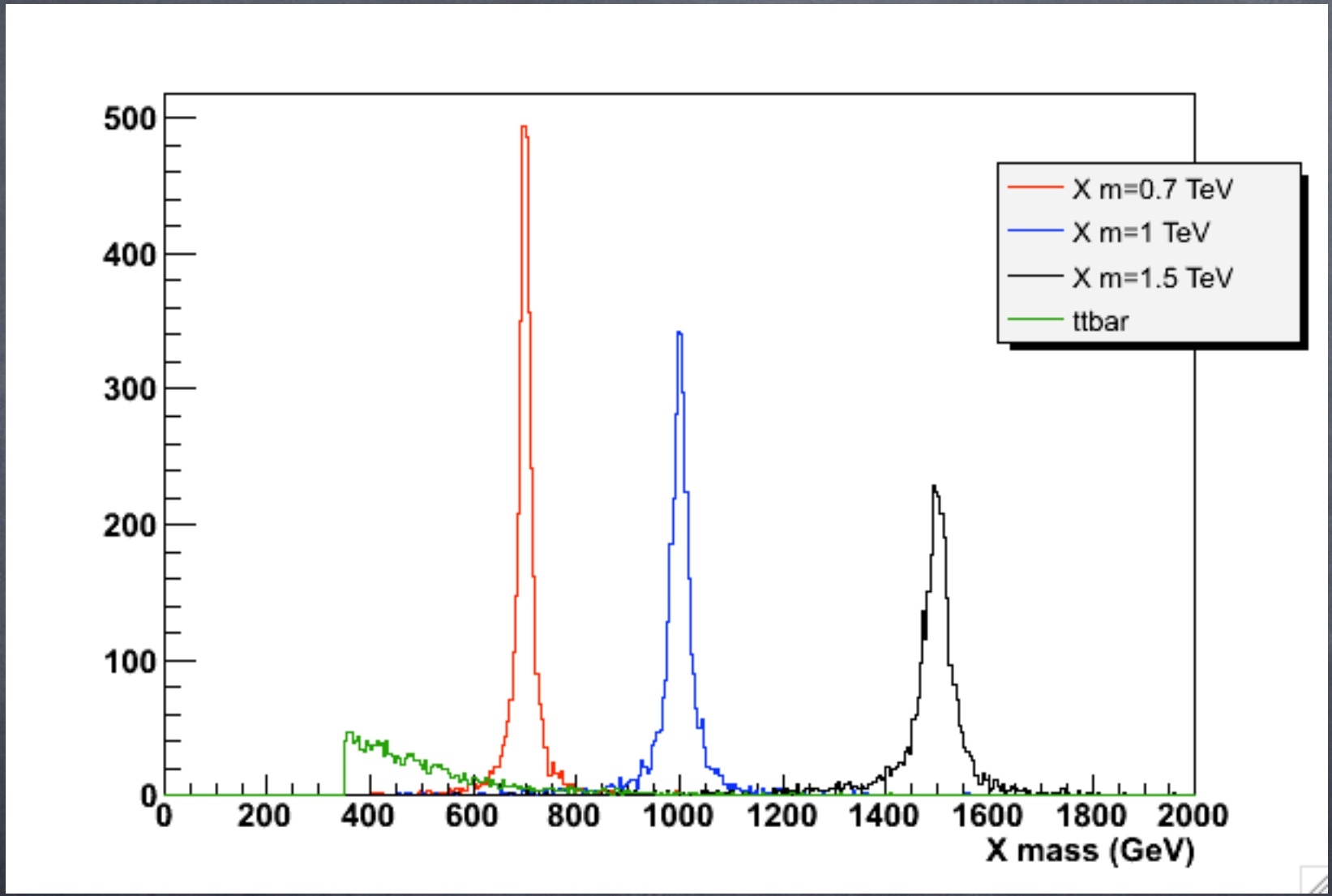
Last week's questions

- Why does the Z' have such a striking pseudorapidity distribution?
- How does the distance between the decay products decrease with increasing mass?

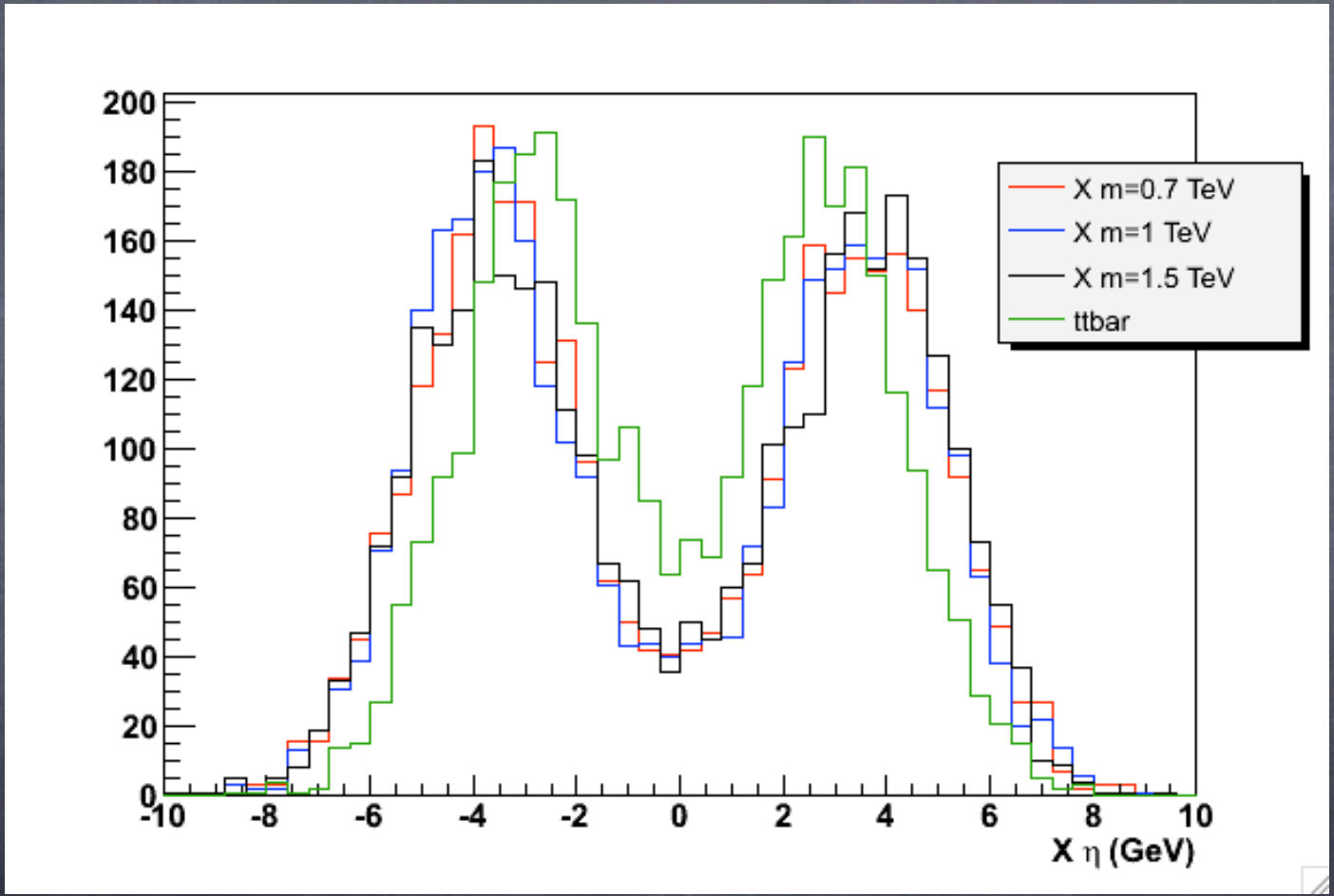


New samples

- Pythia Z' sample with m = 0.7, 1, 1.5 TeV
- McAtNlo ttbar sample
  - generating partons not obvious (couldn't split into parton/gluon samples)
  - has both lepton+jets and dilepton
    - also both positrons and electrons
- Made ntuples with TopView


500
400
300
200
100
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
X mass (GeV)
X m=0.7 TeV
X m=1 TeV
X m=1.5 TeV
ttbar

The mystery deepens



notice how it shifts as mass increases...

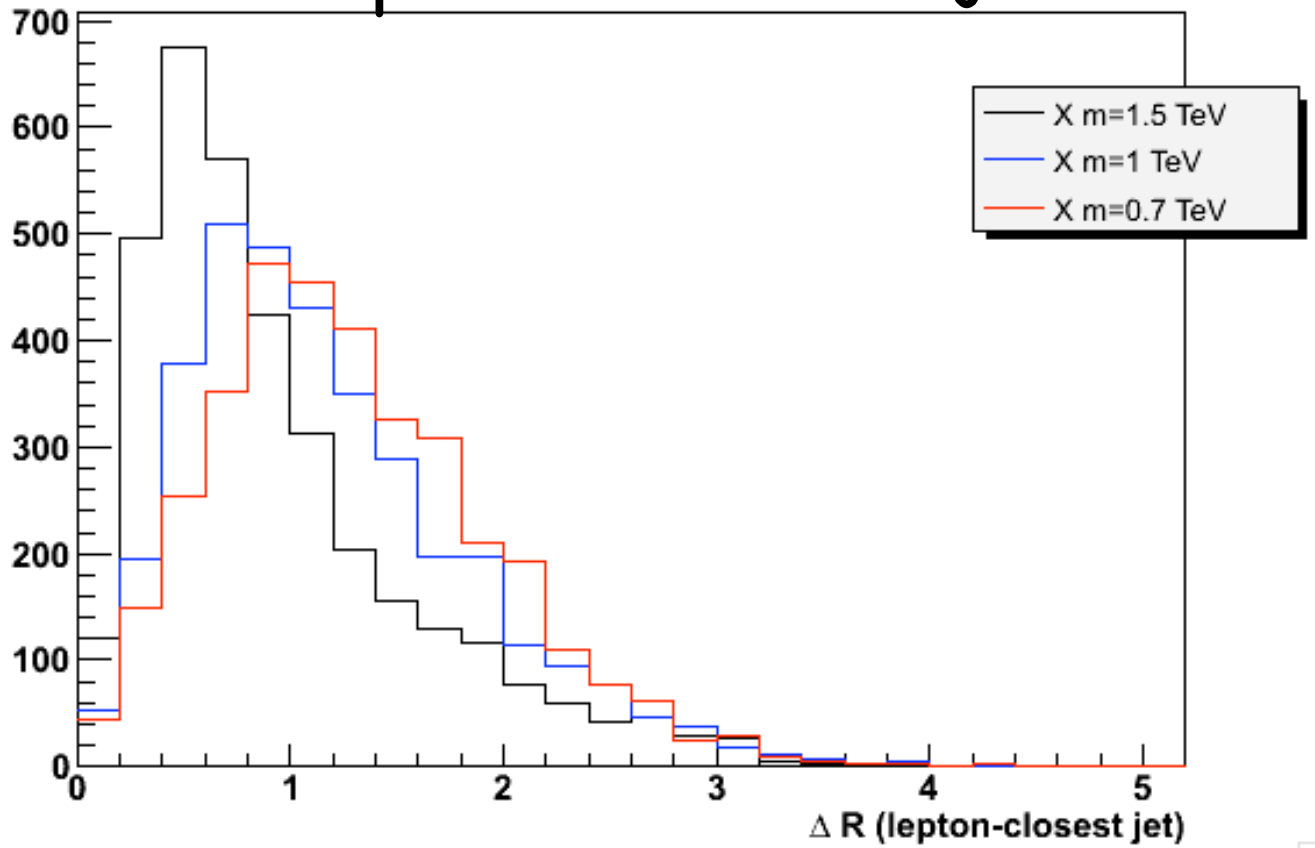
(Partial) Solution

- Pseudorapidity ≠ rapidity!
- Only a good approximation in the relativistic limit ($m^2 \ll p^2$)

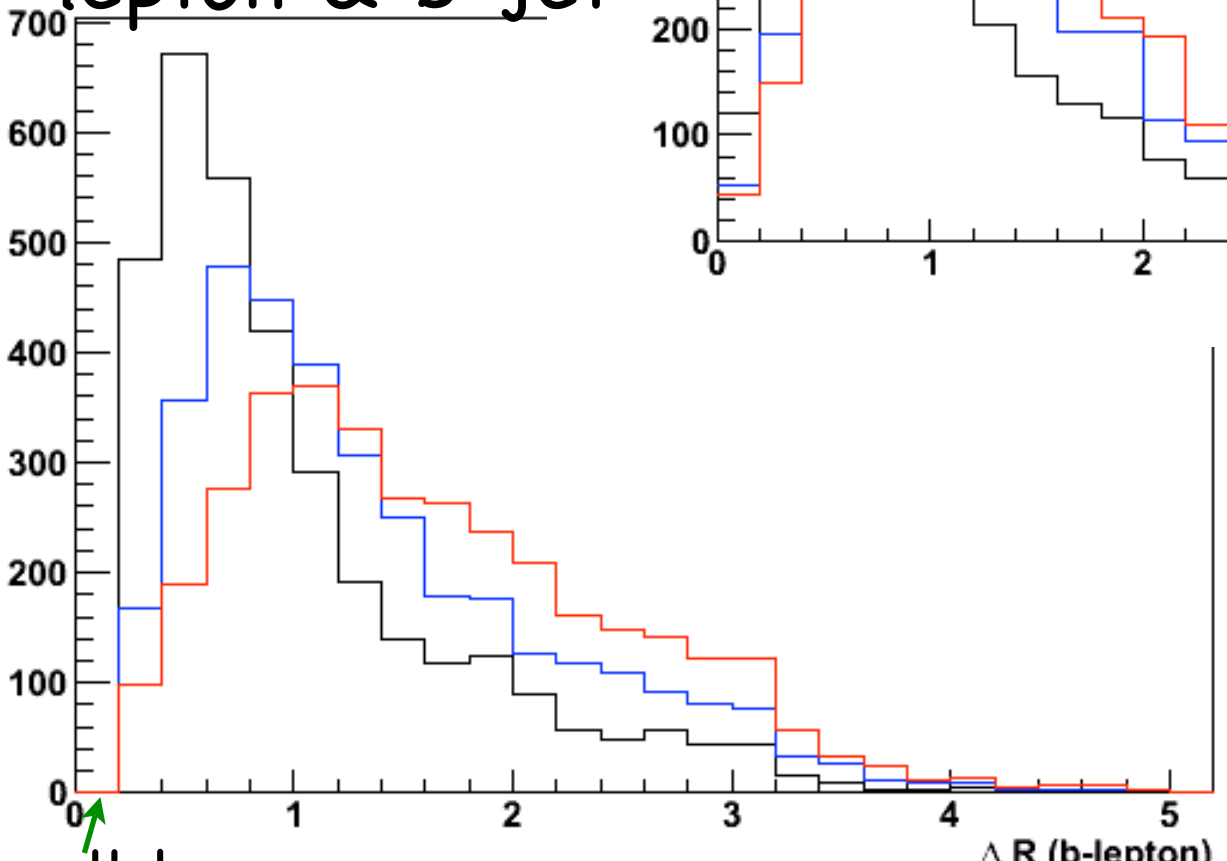
$$\frac{dN}{d\eta dp_T} = \sqrt{1 - \frac{m^2}{m_T^2 \cosh^2 y}} \frac{dN}{dy dp_T}$$

$$m_T^2 = m^2 + p_T^2$$

lepton & closest jet



lepton & b-jet



small bug

Next Steps

- Apply "standard" top group cuts to calculate efficiencies for the different samples
- Calculate a (very rough) S/B
- Start learning about reconstruction